

**REMARKS/ARGUMENTS**

Reconsideration of the application is requested. Claims 21-40 are in the case.

**I. THE OBVIOUSNESS REJECTION**

Claims 21-40 stand rejected under 35 U.S.C. §103(a) as allegedly unpatentable over U.S. Patent 5,877,348 to Ditzel et al. That rejection is respectfully traversed.

The present invention is directed to a process for producing acetic acid. The process is carried out by carbonylating methanol and/or a reactive derivative thereof with carbon monoxide in a carbonylation reaction zone containing a liquid reaction composition comprising an iridium carbonylation catalyst, methyl iodide co-catalyst, a finite concentration of water, acetic acid, methyl acetate, at least one promoter selected from ruthenium, osmium and rhenium and a stabilizing compound selected from alkali metal iodides, alkaline earth metal iodides, metal complexes capable of generating  $I^-$ , salts capable of generating  $I^-$ , and mixtures of two or more thereof. The molar ratio of promoter to iridium is greater than 2 : 1, and the molar ratio of stabilizing compound to iridium is in the range greater than 0 : 1 to 5 : 1, except that, when the stabilizing compound is a lithium compound, the molar ratio of promoter to iridium is greater than 5 : 1 and the molar ratio of the lithium stabilizing compound to iridium is 0.05 : 1 to 5 : 1. According to the invention, loss of the catalyst and/or the promoter from the liquid reaction composition and/or subsequent process streams is reduced.

At the priority date of the present application, acetic acid was typically manufactured on a commercial scale by one of two processes, namely a rhodium

catalyzed process or an iridium catalyzed process. The iridium catalyzed process is proprietary to the assignee of the present case, BP Chemicals Limited.

The rhodium and iridium based processes have different catalytic mechanisms, and the teachings in respect of rhodium cannot generally be directly applied to iridium, and *vice-versa*. In a rhodium based process, the stability of the rhodium catalyst decreases as the amount of water decreases. The carbonylation rate also reduces as the amount of water decreases. Thus, typically, lithium iodide is used in conjunction with rhodium to maintain an acceptable carbonylation rate, i.e, the lithium functions both as a promoter for the rhodium catalyst and also as a stabilizer for the rhodium catalyst.

However, to be effective, substantial quantities of lithium iodide are required. The levels of lithium iodide that are required for rhodium promotion/stabilization are known to poison an iridium catalyst. As Ditzel demonstrates in the Table at column 8, the use of lithium iodide with iridium alone is detrimental to the carbonylation rate (col. 8 lines 36-39). Thus, in contrast to a rhodium process, lithium does not function as a promoter for an iridium catalyst.

However, Ditzel discloses that if lithium is used in conjunction with a conventional iridium promoter such as ruthenium, the lithium has a beneficial effect on the rate as the water concentration decreases (col. 8, lines 51-61). Ditzel focuses solely on improving reaction rate as the concentration of water is reduced. Ditzel thus suggests that the carbonylation rate in a ruthenium promoted iridium system, at low water concentrations, can be maintained/improved by adding lithium iodide.

The Action states on page 4 that “..one of ordinary skill of the art, upon inspection of the graph presented in Fig. 5, would realize that use of higher promoter-iridium ratios

leader to higher rates of reaction and therefore higher rates of throughput.” However, Fig. 5 actually demonstrates that higher carbonylation rates can be achieved by using higher promoter-iridium ratios *in the presence of lithium iodide*. Fig. 5 says nothing about rates of reaction *in the absence of lithium iodide*. Thus, if a person of ordinary skill were to operate with high promoter: iridium ratios and found that the catalyst/promoter system precipitated (which it does at high promoter iridium ratios), the person of ordinary skill would not contemplate applying the Ditzel disclosure because Ditzel is only concerned with **reaction rate**. There is nothing in Ditzel which would point the person of ordinary skill in the direction of adding lithium iodide should the person of ordinary skill discover that the catalyst/promoter has precipitated.

On page 5 of the Action, it is stated that “The stabilising effect of iodide on a variety of Group VIII carbonylation catalysts is well known in the art. It is therefore not *surprising that the presence of iodide ion suppresses precipitation*” (emphasis added).

In response, the stabilizing effect of iodide on a rhodium catalyst is known in the art. The Action provides no evidence to support that such is known for any other Group VIII carbonylation catalysts. For the reasons mentioned above, the teachings in respect of rhodium cannot be directly applied to iridium. As a result, the person of ordinary skill as of the priority date of the present application would have had no expectation that lithium iodide would stabilize an iridium catalyst.

In addition, the problem to be solved is not the stabilization of solely the metal catalyst, but that of the stabilization of the *iridium catalyst in conjunction with the promoter metal*. Thus, given that the art discloses that lithium iodide is used both to promote and stabilize rhodium, the person of ordinary skill could have no expectation

that lithium iodide would successfully suppress the precipitation of iridium in combination with a promoter.

In the commercial manufacture of acetic acid, iridium is used in conjunction with a promoter such as ruthenium. Thus, Experiment B (page 14 of the present application) is representative of a catalyst system employed commercially. At the ratio of 8: 1, it was found that the catalyst/promoter precipitated. At the priority date of the present application, the prior art did not suggest a solution to this precipitation problem. Thus, it was surprising and unexpected that lithium iodide could be used to solve the problem, especially since it was viewed that it only had an effect on rate under low water conditions (as disclosed by Ditzel).

It is clear that no *prima facie* case of obviousness has been generated in this case. Withdrawal of the obviousness rejection is respectfully requested.

#### V. CLAIM AMENDMENTS

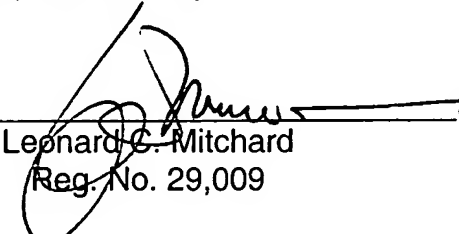
The claims have been amended to improve their form. No new matter is entered.

Favorable action is awaited.

Respectfully submitted,

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